REMARKS

The examiner has rejected claims 11 and 30-36 under 35 U.S.C. 103(a) over Carbin et al. (U.S. 6,117,300) in view of Grazen and Hunt. It is respectfully submitted that the rejection has been overcome by the instant amendment. The claims have been amended to add the subject matter of claim 36 to claim 11, specifying that a surface of the copper metal layer has been provided with a silane adhesion promoting treatment, with the treated surface being between the copper metal layer and the electrically resistive composite material layer, which electrically resistive composite material layer comprises a combination of nickel and particles of alumina. This is neither taught nor suggested by any of the references, either alone or in combination. Claim 36 has now been cancelled.

The invention as presently amended claims a multi-layer foil suitable for forming electrical resistors for inclusion in a printed circuit board comprising a copper metal layer having two opposite sides, one side having a shiny surface and the opposite side having a matte surface, and an electrically resistive composite material layer on the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of nickel and from about 0.01 to about 99.9 area % of particles of alumina; which multi-layer foil is formed by codepositing the alumina and the nickel onto the copper metal layer shiny surface by electrodeposition and wherein the electrically resistive composite material has a resistivity of from about 1 to about 10,000 ohms/square; and a surface of said copper metal layer having been provided with a silane adhesion promoting treatment, said treated surface being between the copper metal layer and the electrically resistive composite material layer.

Carbin et al. describes a method for forming printed circuits by applying a roughened conductive metal layer onto a substrate. This conductive metal may first be applied to a sheet of copper foil and then the copper foil is applied to the substrate with the conductive metal layer located between the copper foil and the substrate. The Examiner

admits that Carbin et al. does not teach a multilayered foil having an electrically resistive composite material layer which is a combination of nickel and particles of alumina. To overcome this deficiency, the Examiner applies Grazen and Hunt. Additionally, the Examiner points out that Carbin et al. discloses that it is known to form resistors for circuit boards by forming a codeposit of metals with non-metals. More particularly, Carbin et al. mentions that it is a known practice to form resistors by codepositing nickel and phosphorus onto a copper foil where resistors are needed in a circuit design. It is urged that Carbin et al. does not teach or suggest the use of a resistor which is a combination of a metal and a non-metal as a part of their described conductive laminates.

With regard to Grazen, this reference pertains to protective coatings on tools and mechanical parts rather than resistors on multilayered foils. Grazen does not pertain to multilayered foils at all, and do not suggest codepositing onto the shiny side of a copper substrate. Furthermore, as the examiner concedes, no copper substrate is taught, much less a copper substrate having a shiny side and a matte side. As no copper substrate is taught, Grazen does not teach a surface of a copper metal layer having been provided with an adhesion promoting treatment. Accordingly, Grazen fails to overcome the deficiencies between Carbin et al. and the presently claimed invention.

With regard to Hunt et al., while this reference teaches a method of depositing a resistive material, such is solely deposited onto an insulating surface (402). See the abstract as well as column 5, lines 28-29, and column 28, lines 1-15. Such may be polymers such as polyimides, epoxy/fiberglass or liquid crystals. It is urged that the depositing performed in Hunt et al. is *not* done by electrodeposition, but rather by combustion chemical vapor deposition. Furthermore, in the present claims it is required that the electrically resistive composite material is formed by codepositing alumina particles and nickel onto a copper metal layer *shiny surface* of a copper metal layer which has a matte surface and a shiny surface. Hunt, et al does not show a copper metal layer which has both a matte surface and a shiny surface. Such is not taught by Hunt et al. wherein no copper shiny side and matte side are mentioned and no electrodeposition is done. There is also no teaching of an electrically resistive composite material has a resistivity of from about 1 to about

10,000 ohms/square. In addition, similar to Grazen, because no copper substrate is taught, Hunt does not teach a surface of a copper metal layer having been provided with a silane adhesion promoting treatment. Accordingly, Hunt also fails to overcome the deficiencies between Carbin et al. and the presently claimed invention.

The Examiner argues that Carbin et al. suggests a multilayered foil with an adhesion promoting layer between a copper metal layer and an electrically resistive composite material layer, stating that they teach a conditioning treatment to a thin conductive layer or a thin conductive layer being formed with a treated surface to improve the ability of materials to adhere to it. The Examiner then leaps to the conclusion that the combination of Carbin et al. with Grazen and Hunt suggests previously claim 36, which has now been incorporated as part of claim 11. It is respectfully submitted that the Examiner is incorrect.

In the first instance, the Examiner failed to establish a *prima facie* case of obviousness. In establishing a *prima facia* case of obviousness under 35 U.S.C. 103, it is incumbent upon the Examiner to provide reasons why one having ordinary skill in the art would have been led to combine references to arrive at the claimed invention. The requisite motivation must stem from some teaching, suggestion or interest in the prior art as a whole or from knowledge generally available to one having ordinary skill in the art. See *Uniroyal, Inc. v. Rudkin Riley, Corp.*, 837 F. 2d 1044, 5 USPQ 2d 1434 (Fed. Cir. 1988); *Ashland Oil, Inc. v. Delta Resin And Refractories, Inc.*, 776 F. 2d 281, 227 USPQ 657 (Fed. Cir. 1985).

Where claimed subject matter has been rejected as obvious in view of prior art references, a proper analysis under 35 U.S.C. 103 requires consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composite or device or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out the claimed invention those of ordinary skill would have a reasonable expectation of success. See *In Re Dow Chemical Company* 837 Fed. 2d 469, 473, 5 USPQ 2d 1529, 1531 (Fed.

Cir. 1988). Both the suggestions and the reasonable expectation of success must be found in the prior art, not in Applicants' disclosure.

Applicants respectfully assert that such a suggestion and/or reasonable expectation of success could not be found in the cited references. None of Carbin et al., Grazen or Hunt, taken singularly or in combination, teach or suggest the claimed subject matter. Specifically, the applied references neither anticipate or suggest a multi-layer foil suitable for forming electrical resistors for inclusion in a printed circuit board comprising a copper metal layer having two opposite sides, one side having a shiny surface and the opposite side having a matte surface, and an electrically resistive composite material layer on the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about 99.9 area % of nickel and from about 0.01 to about 99.9 area % of particles of alumina; which multi-layer foil is formed by codepositing the alumina and the nickel onto the copper metal layer shiny surface by electrodeposition and wherein the electrically resistive composite material has a resistivity of from about 1 to about 10,000 ohms/square; *and a surface of said copper metal layer having been provided with a silane adhesion promoting treatment, said treated surface being between the copper metal layer and the electrically resistive composite material layer.*

Consideration must be given as to whether the combination of references in the manner set forth in the Office Action is proper to render the Applicants' invention obvious in view thereof. It is respectfully asserted that the Examiner's combination of references and conclusions derived therefrom are not proper. Contrary to the Examiner's assertions, there is simply no teaching or suggestion in Carbin et al., as modified by Grazen and Hunt, to form a multi-layer foil suitable for forming electrical resistors for inclusion in a printed circuit board comprising a copper metal layer and an electrically resistive composite material layer on the copper metal layer. To support this argument, the Examiner points to a general statement in Carbin et al. stating that it is known in the art to form resistors for circuit boards by forming a codeposit of metals with non-metals, e.g. nickel and phosphorus, on a copper foil where resistors are needed in a circuit design.

However, Carbin et al. does not teach, suggest or even relate to the formation of resistors. Carbin et al. relates to the formation of conductive traces and printed circuits made having conductive traces. Aside from the general statement at column 4, lines 10-21, Carbin et al. does not again mention such resistors within the context of their invention. There is no description, no prophetic discussion and no suggestion that the invention of Carbin et al. may be carried out such that a resistor is formed which comprises a combination of metal and non-metal components.

It is respectfully asserted that one of ordinary skill in the art would not look to Grazen and Hunt et al. in combination with Carbin et al. to achieve a multilayer foil having such a resistor as claimed herein. It is further urged that one of ordinary skill in the art would not have a reasonable expectation of success to arrive at the presently claimed invention upon a reading of such a combination of references.

It is also respectfully asserted that Carbin et al. would not teach or suggest to one of ordinary skill in the art to have a resistor, as claimed, deposited onto a surface of a copper foil which foil has a surface that has been provided with an adhesive promoting treatment. Carbin et al. goes no further than teaching that a copper foil surface may be roughened to improve adhesion of another metallic layer to the copper foil surface. Carbin et al. neither describes nor suggests that a *silane* adhesion promoting treatment to a surface of a copper foil is appropriate to improve the adhesion between said copper foil and a resistor which is a combination of metal and non-metal components. Grazen and Hunt fail to teach or suggest such a treated surface as well.

For these reasons, it is respectfully submitted that the rejection has been overcome by the instant amendment, and that the claimed invention would not be obvious to one skilled in the art in view of the applied combination of references.

Applicants have further amended the present invention to now include new claims 37-48. Each of these claims include a multi-layer foil having a *silane adhesion promoting layer* between an electrically conductive metal layer and a layer of electrically resistive

composite material. It is urged that the claimed structure, having this silane adhesion promoting layer, is not taught, suggested, or known in the art.

The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,

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